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WHAT IS CLAIMED IS:

1. A control apparatus for a hybrid vehicle having an engine and a motor as drive power sources, and having a transmission that is disposed between the engine and a

5 vehicle drive wheel and that changes drive power transmission by selection from a plurality of gear speeds, the control apparatus comprising:

a controller that detects a drive power requested for the vehicle drive wheel and that adjusts the drive power by setting an engine output increase, a motor output increase, and a gear speed change in a gear ratio increasing direction, in an order of descending priorities of: (1) the motor output increase, (2) the motor output increase, and (3) the gear speed change in the gear ratio increasing direction, so as to achieve the drive power requested.

2. A control apparatus according to claim 1, wherein the controller:

(a) initially selects a gear speed of a least gear ratio within a range such that an engine revolution speed higher than or equal to a predetermined lower limit revolution speed is attainable;

(b) achieves the requested drive power singly by the engine output with the gear speed selected; otherwise

25 (c) achieves the requested drive power by the engine output and a motor output when the requested drive power is not achievable singly by the engine output; otherwise

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(d) changes the gear speed in a gear ratio increasing direction when the requested drive power is not achievable by the engine output and the motor output.

5 3. A control apparatus according to claim 2, wherein the controller changes the gear speed in accordance with a factor that affects a motor control.

10 4. A control apparatus according to claim 3, wherein the controller changes the gear speed based on at least one of a state of charge of a battery, a battery temperature, and an inverter temperature, which are factors that affect the motor control.

15 5. A control apparatus according to claim 1, wherein the controller changes the gear speed in accordance with a factor that affects a motor control.

20 6. A control apparatus according to claim 1, wherein the controller detects the requested vehicle drive power based on a vehicle speed and an amount of operation of an accelerator.

25 7. A control apparatus for a hybrid vehicle having an engine and a motor as drive power sources, and having, between the engine and a vehicle drive wheel, a transmission that changes drive power transmission by

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selection from a plurality of gear speeds, the control apparatus comprising:

a controller that detects a drive power requested for the vehicle drive wheel and that sets a gear speed of the transmission and an operation state of the engine such that the engine is operated in a predetermined high-efficiency operation state, and such that a difference between the vehicle drive power requested and an engine output is compensated by one of a drive operation of the motor and a regenerative operation of the motor.

8. A control apparatus according to claim 7, wherein the controller sets in the transmission a gear speed of a least gear ratio within a range such that the engine is operated in the predetermined high-efficiency operation state, and such that the difference between the vehicle drive power requested and the engine output is compensated by one of the drive operation of the motor and the regenerative operation of the motor.

9. A control apparatus according to claim 8, wherein the predetermined high-efficiency operation state is a state where a multiplication product of an efficiency of the engine and a transmission efficiency of the transmission maximizes.

10. A control apparatus according to claim 9, wherein the

controller sets the gear speed of the transmission and the operation state of the engine such that the engine is operated in a predetermined good emission region.

5 11. A control apparatus according to claim 8, wherein the controller sets the gear speed of the transmission and the operation state of the engine such that the engine is operated in a predetermined good emission region.

10 12. A control apparatus according to claim 7, wherein the predetermined high-efficiency operation state is a state where a multiplication product of an efficiency of the engine and a transmission efficiency of the transmission maximizes.

15 13. A control apparatus according to claim 12, wherein the controller sets the gear speed of the transmission and the operation state of the engine such that the engine is operated in a predetermined good emission region.

20 14. A control apparatus according to claim 7, wherein the controller sets the gear speed of the transmission and the operation state of the engine such that the engine is operated in a predetermined good emission region.

25 15. A control apparatus for a hybrid vehicle having an engine and a motor as vehicle drive power sources and

having, between the engine and a vehicle drive wheel, a transmission that changes drive power transmission by selection from a plurality of gear speeds, the control apparatus comprising:

5        a controller that detects a drive power requested for the vehicle and that sets a gear speed of the transmission such that an efficiency of regenerative braking performed by the motor maximizes when the requested drive power is negative.

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16. A control apparatus according to claim 15, wherein when the requested drive power is negative, the controller sets a gear speed of a least gear ratio in the transmission.

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17. A control apparatus according to claim 15, wherein the gear speed selected varies in accordance with whether or not an operation of the engine is at a stop during a regenerative operation of the motor.

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18. A control apparatus according to claim 17, wherein the controller selects a gear speed of a least gear ratio during an operation of the engine.

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19. A control apparatus for a hybrid vehicle according to claim 17, wherein the controller selects a gear speed such that a drive efficiency of the motor maximizes during a

stop of operation of the engine.

20. A control method for a hybrid vehicle having an engine and a motor as drive power sources, and having a transmission that is disposed between the engine and a vehicle drive wheel and that changes drive power transmission by selection from a plurality of gear speeds, the control method comprising:

detecting a drive power requested for the drive  
10 wheel; and

adjusting the drive power by setting an engine output increase, a motor output increase, and a gear speed change in a gear ratio increasing direction, in an order of descending priorities of: (1) the motor output increase,  
15 (2) the motor output increase, and (3) the gear speed change in the gear ratio increasing direction, so as to achieve the drive power requested.

21. A method according to claim 20, wherein the drive  
20 power adjusting step includes the steps of:

initially selecting a gear speed of a least gear ratio within a range such that an engine revolution speed higher than or equal to a predetermined lower limit revolution speed is attainable;

25 achieving a requested drive power singly by an engine output with the gear speed selected; otherwise achieving the requested drive power by the engine

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output and a motor output when the requested drive power is not achievable singly by the engine output; otherwise changing the gear speed in a gear ratio increasing direction when the requested drive power is not achievable by the engine output and the motor output.

22. A control method for a hybrid vehicle having an engine and a motor as drive power sources, and having, between the engine and a vehicle drive wheel, a transmission that changes drive power transmission by selection from a plurality of gear speeds, the control method comprising:

detecting a drive power requested for the vehicle drive wheel; and

setting a gear speed of the transmission and an operation state of the engine such that the engine is operated in a predetermined high-efficiency operation state, and such that a difference between the vehicle drive power requested and an engine output is compensated by one of a drive operation of the motor and a regenerative operation of the motor.

23. A control method for a hybrid vehicle having an engine and a motor as vehicle drive power sources and having, between the engine and a vehicle drive wheel, a transmission that changes drive power transmission by selection from a plurality of gear speeds, the control

method comprising:

detecting a drive power requested for the vehicle;

and

setting a gear speed of the transmission such that an  
efficiency of regenerative braking performed by the motor  
maximizes when the requested drive power is negative.